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(54) **BONE REAMER FOR SHARPING BONE SOCKETS OR CAVITIES DURING ORTHOPAEDIC SURGERY**

FRÄSSWERKZEUG ZUM ERZEUGEN VON GELENKPFANNEN ODER HOHLRÄUMEN BEI ORTHOPÄDISCH-CHIRURGISCHEN EINGRIFFEN

ALESOIR DESTINE A FORMER UNE EMBOITURE OU UNE CAVITE OSSEUSE LORS D'UNE INTERVENTION CHIRURGICALE ORTHOPEDIQUE

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(73) Proprietor: **Astra Tech AB**
431 21 Mölndal (SE)

(72) Inventors:
- **ALBREKTSSON, Björn**
  S-430 33 Fjäras (SE)
- **CARLSSON, Lars**
  S-429 31 Kullavik (SE)
- **JACOBSSON, Magnus**
  S-412 69 Göteborg (SE)
- **RÖSTLUND, Tord**
  S-429 35 Kullavik (SE)
- **WENNBERG, Stig**
  S-424 57 Gunnilse (SE)

(74) Representative: **Giver, Sören Bo et al**
Awapatent AB,
P.O. Box 113 94
404 28 Göteborg (SE)

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Description

Technical field of the invention

[0001] The invention relates to the field of bone cutters or reamers for shaping bone sockets or cavities to a desired form during orthopaedic surgery.

Background art

[0002] The invention is especially, but not exclusively, applicable to the field of reaming hip-joint cavities (acetabulea) in the pelvis to a desired form, in preparation for inserting an acetabular cup. Therefore, the technical background to the invention will be described with specific reference to cutters or reamers for shaping acetabular cavities and the problems encountered when using prior-art cutters. A preferred embodiment of the reamer according to the invention is especially useful in connection with the type of acetabular cups disclosed in WO 95/17140. However, the invention may be used also in connection with the shaping of other sockets for receiving artificial joint prosthesis components.

[0003] One conventional type of reamer for shaping bone sockets comprises a cutting head, which in use is rotated about a rotational axis for removing material from the socket, and which cutting head is formed by a fully hemispherical wall defining an essentially closed internal chamber. A plurality of relatively small, outwardly projecting, bowl-shaped cutting elements, each defining a small cutting edge, are punched out from or otherwise formed in the hemispherical wall. This design is normally referred to as a "cheese grater". Each cutting element forms a narrow passage leading from the exterior hemispherical surface into the internal chamber of the cutting head. In order to avoid undesired interference phenomena during the reaming operation, the cutting elements are normally distributed in an asymmetrical pattern over the hemispherical surface. Especially, the cutting elements may be distributed along a spiral line as seen in the direction of the rotational axis.

[0004] A drawback of this conventional type of reamer having an essentially closed configuration and a plurality of small bowl-shaped cutting elements is that loose cut-off material (debris) will be present at the site of the cutting operation. This is a consequence of the essentially closed configuration of the cutting head and the fact that the bowl-shaped cutting members form only narrow passages for the cut-off material. The presence of loose material at the cutting site may lead to an inaccurate cavity preparation, whereby undesired gaps will be present between the reamed cavity surface and the subsequently inserted acetabular cup. Bone growths cannot bridge to large a gap, so that a portion of the cup surface will be too distant from bone to allow proper attachment. As a result, an optimal cup fixation cannot be obtained, especially in the case of uncemented prosthesis components, where such gaps may reduce initial and long term stability. Also, loose material will clog the reamer, causing an undesired excessive heat generation in the bone tissue, which may damage the bone-tissue viability and thereby reduce its capacity to form new bone. New bone formation is essential for obtaining osseointegration.

[0005] Another drawback of this prior-art reamer is that the cutting operation effected by the relatively small, bowl-shaped cutting elements will not result in a smooth cavity surface. Instead, each bowl-shaped cutting element creates circumferentially directed "macro"-grooves in the socket surface during the reaming operation.

[0006] A further drawback of this conventional-type reamer is that the asymmetrical distribution of the cutting elements may generate an unintentional "wobbling" of the reamer during rotation thereof. More specifically, as a result of the cutting elements not being symmetrically, arranged over the hemispherical surface, the counterforces generated at each cutting point may together lead to a situation where the cutting head is unequally loaded. The resultant load acting on the cutting head may therefore displace and/or tilt the axis of rotation, whereby the cavity will receive an undesired shape, such as an elliptical cross section.

[0007] The above-mentioned drawback related to the formation of circumferentially directed grooves may be reduced by replacing the relatively small bowl-shaped cutting elements with longer cutting edges extending in essentially radial planes along the hemispherical surface, as shown in US 4 131 116. This document discloses a bone cutter for shaping a socket, such as a hip socket, comprising a cutting head located at one end of a rotatably driven shaft and having a fully hemispherical portion with a substantially closed exterior surface. The hemispherical portion defines an essentially closed, hollow internal chamber, and is provided with a number of slots connecting the exterior surface and the internal chamber. A cutting edge, raised slightly above the hemispherical surface, is provided at each slot for moving bone material from the socket into the internal chamber. In the disclosed embodiment, one cutting edge extends past the pole region, i.e. the point where the axis of rotation intersects the hemispherical surface, such that also the bottom of the socket will be reamed.

[0008] Resilient quick release means are arranged for connecting and disconnecting the cutting head and the shaft. A cylindrical portion integral with the base of the hemispherical portion is arranged for limiting outward movement of said resilient quick release means.

[0009] This prior-art document also describes a conventional reaming technique of starting with a cutting head of smaller radius and increasing the size of the cutting head in increments to enlarge the radius of the socket.

[0010] A drawback with the design disclosed in US 4 131 116 is that a undesired "catching" or "biting" effect" may occur between the cutting means and the

cavity edge, especially each time the cutting head diameter is increased.

[0011] Another drawback inherent in cutting heads in the form of a full spherical dome is that it is difficult to guide the reamer precisely along the intended rotational axis without tilting the cutting head in the bone socket.

[0012] EP 0 508 710 A1 discloses a reamer having an open structure rather than a full spherical dome. The reamer comprises a reaming head having a plurality of spaced walls around the longitudinal axis and tip edges for penetrating bone are defined on the walls. Reaming edges joined to the tip edges extend longitudinally from the tip edges for reaming a cylindrical tunnel.

[0013] It is, therefore, an aim of the invention to provide a reamer by which the shaping or preparation of a bone socket can be performed more precisely.

[0014] A specific aim of the invention is to provide a reamer by which the above-mentioned "catching effect" is eliminated or at least substantially reduced.

[0015] A further aim of the invention is to provide a reamer which eliminates or at least substantially reduces the above-mentioned problem of cut-off material present at the cutting site between the reamer and the bone socket.

[0016] A yet further aim of the invention is to provide a reamer by which a smooth inner surface of the socket can be obtained.

[0017] Another further aim of the invention is to provide a reamer which is more easy to guide along a predetermined rotational axis during the reaming operation, in order to avoid tilting of the reamer relative to said axis.

[0018] It is also an aim of the invention to provide a method for implanting a prosthesis component in a bone socket, by which method the shaping or preparation of the bone socket can be performed more precisely, and to provide a kit for use in performing such a method.

Disclosure of the invention

[0019] Thus, a reamer according to the invention for shaping a bone socket, such as a acetabular cavity (acetabulum), comprises a cutting head having a top which in use is directed towards the bone socket, and a base axially spaced from the top along a rotational axis of the cutting head. The cutting head is provided with cutting means for removing material from the socket during the rotation of the cutting head about the rotational axis. The reamer according to the invention is characterised in that the cutting means comprises a number of relatively long main cutting edges, each of which extends in a direction from the base to the top, and a number, higher than said number of main cutting edges, of relatively short peripheral cutting edges, which are located at the base of the cutting head and distributed at angulary spaced intervals about said rotational axis.

[0020] The reamer according to the invention makes it is possible to perform a more precise shaping or reaming operation of a bone socket, compared with the prior-art reamers or bone cutters. By arranging more cutting edges in the periphery than in the top portion, the load or pressure on the peripheral cutting edges will be reduced compared with the load on the main cutting edges. The reduced load on the peripheral cutting edges will reduce the above-mentioned "catching", while the load on the main cutting edges can be kept at a sufficiently high level to ensure a proper cutting operation. Also the problem related to the presence of cut-off material in the cutting area is reduced. This is due to the fact that the number of the main cutting edges in the top portion can be limited to such an extent that the cut-off material can effectively be removed in the regions between the main cutting edges. The inventive reamer is also advantageous in relation to the first-mentioned cutter having small bowl-shaped cutting edges. In the inventive reamer, each of said main cutting edges will follow the curvature of the bone cavity such that no cutting grooves are created.

[0021] In a preferred embodiment, each of the main cutting edges is formed by a respective leg, extending between and interconnecting the top and the base of the cutting head. In the regions between adjacent legs, material-receiving openings are provided for guiding the cut-off material into an interior chamber of the cutting head. The cutting head will thereby present an essentially cage-like, substantially open design. In this context it should be noted that the reamer might work also with one single main cutting edge.

[0022] In a preferred embodiment, the number of peripheral cutting edges is at least twice the number of main cutting edges. If the number of peripheral cutting edges is an integer multiple of the number of main cutting edges, it is possible to evenly distribute the peripheral cutting edges relative to the main cutting edges. Within the scope of the invention, these two numbers, and the ratio between them, may vary substantially.

[0023] In order to obviate interference phenomena during the reaming operation, the main cutting edges can be "ribbed". This implies that at least some of the main cutting edges are divided by notches or the equivalent into smaller cutting edge portions, and that the notches are arranged in different patterns in adjacent main cutting edges. The purpose of "ribbing" the main cutting edges is to ensure that each main cutting edge always will maintain proper contact with the socket surface during the reaming operation. If the edges are not ribbed there is a risk that the edges might "jump" on the socket surface, leading to undesired interference phenomena.

[0024] Another way of reducing interference phenomena is to arrange the main cutting edges and/or the peripheral cutting edges in an asymmetrical pattern about the rotational axis, i.e. with varying angular spacings between the cutting edges

[0025] It is preferred that the cutting head comprises a portion in the form of a truncated dome, the pole region

of which defines the top of the cutting head, wherein each of the main cutting edges extends in a direction from a base region of the dome towards the pole region of the dome. This embodiment is advantageous in that a cylindrical entrance portion can be formed in the socket without increasing the depth of the shaped cavity unacceptably. The purpose of providing such a cylindrical entrance portion in the socket will be explained in the following. In an especially preferred variant of this embodiment, the cutting head is further provided with a cylindrical base portion connected to such a truncated dome portion. During the shaping of the bone socket, the dome-shaped portion of the cutting head is completely received in the bone socket to such an extent, that said cylindrical entrance portion is formed in the socket by said cutting means and, thereby, the cylindrical portion of the cutting head is received at least partly in said cylindrical entrance portion of the socket. As a result, the cylindrical portion of the cutting head is effectively guided and centred by the socket during the reaming operation, thereby avoiding, or at least substantially restricting, unintentional tilting of the cutting head.

[0026] A method according to the invention for implanting a prosthesis component in a bone socket, such as an acetabular cavity (acetabulum), comprises the step of shaping the bone socket to a desired form for receiving the prosthesis component, and the step of subsequently inserting the prosthesis component into the bone socket. The method is characterised in that the step of shaping the bone socket is performed by the use of a rotational-type reamer having a cutting head, which comprises a top portion provided with cutting means for the removal of material from said bone socket, and a cylindrical base portion, and, in that, during said step of shaping the bone socket, the top portion of the cutting head is completely received in the bone socket to such an extent, that a cylindrical entrance portion is formed in the socket by said cutting means and, thereby, the cylindrical portion of the cutting head is received at least partly in said cylindrical entrance portion of the socket. As a result, the cylindrical portion of the cutting head will be effectively guided and centred by the cylindrical portion of the socket wall, whereby any unintentional tilting of cutting head during the reaming operation can be avoided or at least reduced.

[0027] According to another aspect of the invention, there is also provided a reamer for shaping a bone socket, such as a acetabular cavity, comprising a cutting head having a top which in use is directed towards the bone socket, and a base axially spaced from the top along a rotational axis of the cutting head, said cutting head being provided with cutting means for removing material from the socket during rotation of the cutting head about the rotational axis. The reamer is characterised in that said cutting means comprises a number of relatively long main cutting edges, each of which extends in a direction from the base to the top, and in that the base of the cutting head has a cylindrical outer peripheral surface concentric with and parallel to the rotational axis, whereby, in use of the reamer, said cylindrical outer peripheral surface is received at least partly in the socket and guided thereby for preventing or reducing unintentional tilting of the rotational axis.

[0028] The above and other features and advantages of the invention are set out in the claims and will be apparent from the following detailed description of a exemplary embodiment of an reamer according to the invention.

Brief description of the drawings

[0029] Fig.1-7 illustrates a reamer according to a preferred embodiment of the invention, wherein:

Fig. 1 is a side elevational view;

Fig. 2 is a top elevational view;

Fig. 3 is a bottom elevational view;

Fig. 4 is a top perspective view;

Fig. 5 is a bottom perspective view;

Fig. 6 is a transverse section taken along the line VI-VI in Fig. 2;

Fig. 7 is an enlarged top elevational view of a portion of the reamer shown in Fig 2; and

Fig. 8 is a schematic perspective view illustrating the use of the reamer in Figs 1-7 for shaping an acetabular cavity.

Detailed description of a preferred embodiment

[0030] Referring now to Figs 1-7, wherein like parts are indicated by like reference numerals, there is illustrated a reamer or cutting head 10 in accordance with a preferred embodiment of the invention. This exemplary embodiment is especially intended for reaming acetabular cavities (acetabulae) in connection with the implantation of acetabular prosthesis cups. A method of using the cutting head 10 for this purpose is illustrated in Fig. 8.

[0031] With respect to the overall design, the cutting head 10 is divided into three integrated parts: a cage-like, dome-shaped top portion 12, a cylindrical base portion 14, and quick-release means in the form of two hooks 16 by which the cutting head 10 can be releasably connected to a handle member (not shown) for rotating the cutting head about a rotational axis A. Both the dome-shaped top portion 12 and the cylindrical base portion 14 have circular cross-sections concentric with the axis A.

[0032] The dome-shaped top portion 12 has the form

of a truncated hemispherical dome, i.e. a hemispherical dome truncated at its base portion. Thus, as indicated in Fig. 1, the height h is less than the radius r. The truncated dome presents a pole region 18 and a base region 20 interconnected by eight legs 22, which are arranged at angulary spaced intervals (45°) with respect to the axis A. The curvature of the legs 22 defines the curvature of the truncated dome. Each leg 22 forms a relatively long main cutting edge 24. In this embodiment, the cutting edge is formed by a cutting surface 26 laying in a radial plane parallel to the axis A, and a release surface 28 inclined relative to the cutting surface 26.

[0033] A plurality of notches 30 are formed in the main cutting edges 24, dividing each of the main cutting edges 24 into smaller cutting edges. In this embodiment, two or three notches 30 are formed in each leg 22. As seen in the top elevational view in Fig. 2, the notches 30 of two adjacent legs 22 are located at different radial positions. This results in that said smaller cutting edges will be arranged in a spiral fashion about the axis A, as will be evident from Fig. 2. This arrangement of the cutting edges 24 is referred to as ribbed cutting edges, and the purpose thereof has been indicated above.

[0034] At the pole region 18 of the truncated dome, the legs 22 are interconnected by means of a ring-shaped structure 32. Two of the legs 22 (the ones which are directed along the line VI-VI in Fig. 2) extend all the way to and beyond the axis A, in order to ensure that also the bottom of the acetabular cavity is reamed. The legs 22 and the ring-shaped structure 32 define two top openings 34 in the pole region 18 of the truncated dome.

[0035] The cylindrical base portion 14, which is integrated with the top portion 12, is in the form of a cylindrical ring having a smooth bottom surface 36, a smooth outer cylindrical surface 38, a smooth inner cylindrical surface 40 and a top which is provided with a number of sawtooth-like projections 42. Seen in a radial direction towards the axis A, each projection 42 has a triangular cross-section. The radially outer surface 43 of each projection 42 is contiguous with the cylindrical outer surface 38. An outer inclined portion of the apex of each projection 42 forms a relatively short peripheral cutting edge 44.

[0036] In the illustrated embodiment, twenty-four peripheral cutting edges 44 are distributed at angulary spaced intervals (15°) along the circumference of the base portion 14. Thus, there are three times as many peripheral cutting edges 44 than main cutting edges 24. One third of the peripheral cutting edges 44 are actually formed by the end portions of the main cutting edges 22. Thereby, the legs 22 are supported by and connected to the cylindrical base portion 14.

[0037] The combination of the legs 22, the ring-shaped structure 32 and the projections 42 defines eight relatively large through openings 46 in the dome-shaped top portion 12, communicating with an internal chamber in the cutting head 10. As apparent from the drawings, the cutting head 10 presents an essentially open, cage-like design.

[0038] The use of a reamer or cutting head 10 according to the embodiment disclosed in Figs 1-7 will now be described with reference to Fig. 8. Fig. 8 illustrates a part of a human pelvis 48 with a acetabular cavity (acetabulum) 50 prepared by a cutting head 10 shown in a retracted position. The outer contour of the cutting head 10, i.e. the truncated dome-shape and the cylindrical base portion, corresponds to the inner contour of the prepared cavity 50. Thus, the cavity 50 has been reamed to such an extent, that the dome-shaped portion, i.e. the cutting edges 24 and 44, has shaped a cylindrical inner wall portion 52 at the entrance opening of the cavity 50. During the reaming operation, this cylindrical inner wall portion 52 provides a guiding surface for the cylindrical outer surface 38 of cutting head. Subsequently to the reaming operation, an acetabular cup, especially of the design disclosed in the above-mentioned WO 95/17140, may be inserted into the prepared cavity, such that a cylindrical base portion of the cup is received with a tight fit in the cylindrical entrance portion of the socket.

[0039] Several modifications of the embodiment described above are conceivable within the scope of the appended claims. For example, the number of legs 22 and the number of projections 42 may be varied. In fact, it might be possible to use only one single leg 22. Furthermore, the top portion 12 may have other shapes than the disclosed dome shape. Also, the cutting head 10 may be designed as a more compact structure without any internal hollow chamber, and in that case the cut-off debris has to be removed by channel means or the equivalent arranged between the main cutting edges. In a more simple embodiment, the notches 30 may be dispensed with. The peripheral cutting edges 44 may be completely separate from the main cutting edges 24. Finally, the main cutting edges 24 and/or the peripheral cutting edges 44 may be distributed at varying angular spacings in order to avoid interference phenomena.

Claims

1. A reamer for shaping a bone socket (50), such as an acetabular cavity, comprising a cutting head (10) having a top which in use is directed towards the bone socket (50), and a base axially spaced from the top along a rotational axis (A) of the cutting head (10), said cutting head (10) being provided with cutting means (24, 44) for removing material from the socket (50) during rotation of the cutting head (10) about the rotational axis (A), said cutting means (24, 44) comprising

a number of relatively long main cutting edges (24) located at a top portion of the cutting head (10), each of which extends in a direction from the base to the top, **characterised in that** said cutting means further comprises a number, higher than said

number of main cutting edges (24), of relatively short peripheral cutting edges (44), which are located at the base of the cutting head (10) and distributed at angulary spaced intervals about said rotational axis (A).

2. A reamer as claimed in claim 1, wherein the number of said peripheral cutting edges (44) is at least twice the number of said main cutting edges (24).

3. A reamer as claimed in claim 1 or 2, wherein the cutting head (10) comprises a portion (12) in the shape of a dome, the pole region (18) of which defines said top of the cutting head (10).

4. A reamer as claimed in claim 3, wherein said dome-shaped portion (12) of the cutting head (10) has the form of a hemispherical dome.

5. A reamer as claimed in claim 3, wherein said dome-shaped portion of the cutting head (10) has the form of a hemispherical dome, which is truncated at its base portion.

6. A reamer as claimed in any of claims 3-5, wherein each of said main cutting edges (24) extends from the base region (20) of the dome to the pole region (18) of the dome.

7. A reamer as claimed in any of claims 3-6, wherein at least one of said main cutting edges (24) extends all the way up to a point where the axis (A) intersects with the dome.

8. A reamer as claimed in any of the preceding claims, wherein each of said main cutting edges (24) lies in a respective radial plane relative to the rotational axis (A).

9. A reamer as claimed in any of the preceding claims, wherein some of the peripheral cutting edges (44) are formed by end portions of the main cutting edges (24), whereas the rest of the peripheral cutting edges (44) are formed as individual cutting edges separate from the main cutting edges (24).

10. A reamer as claimed in any of the preceding claims, wherein each of said main cutting edges (24) is formed by a respective leg (22), extending between and interconnecting the top and the base of the cutting head (10), and wherein material-receiving openings (46) are provided between the legs (22) for guiding cut-off material into an interior chamber of the cutting head.

11. A reamer as claimed in any of the preceding claims, wherein the base of the cutting head (10) has a cylindrical outer peripheral surface concentric with and parallel to the rotational axis (A), whereby, in use of the reamer, said cylindrical outer peripheral surface (38) is received at least partly in the socket (50) and guided thereby for preventing unintentional tilting of the rotational axis (A).

12. A reamer as claimed in claim 11, wherein the cylindrical outer peripheral surface (38) of the cutting head (10) is designed not to have any cutting effect, but only to accomplish said tilt-preventing guiding effect.

13. A reamer as claimed in any of the preceding claims, wherein said number of main cutting edges (24) is two or more.

14. A reamer as claimed in claim 13, wherein the main cutting edges (24) are symmetrically distributed about the rotational axis (A).

15. A reamer as claimed in claim 13, wherein the main cutting edges (24) are asymmetrically distributed about the rotational axis (A).

16. A reamer as claimed in any of claims 13-15, wherein the main cutting edges (24) are ribbed.

17. A kit for use in orthopaedic surgery, comprising in combination a reamer as claimed in any one of claims 1-16 for the preparation of a bone socket (50), especially the acetabulum, said reamer having a dome-shaped portion provided with cutting means, and a cup-shaped prosthesis component for implantation in the bone socket (50), **characterised in that** the cup-shaped prosthesis component has a dome-shaped portion and a cylindrical base portion, and **in that**, in use of said kit, the bone socket (50) is reamed out to such a depth that a cylindrical entrance portion (52) is formed therein, and **in that** the cylindrical base portion of the prosthesis is received at least partly in said cylindrical entrance portion (52).

Patentansprüche

1. Fräswerkzeug zur Formgebung einer Gelenkpfanne (50), beispielsweise einer Acetabular-Höhlung, das einen Schneidkopf (10) mit einem Oberbereich aufweist, der beim Gebrauch nach der Gelenkpfanne (50) gerichtet ist, und mit einem Grundbereich, der sich im axialen Abstand vom Oberbereich entlang einer Rotationsachse (A) des Schneidkopfes befindet, wobei der genannte Schneidkopf (10) mit Schneidmitteln (24, 44) zum Abtragen von Material aus der Gelenkpfanne (50) während der Rotation des Schneidkopfes (10) um die Rotationsachse (A) versehen ist und die genannten Schneidmittel (24,

44) eine Anzahl von relativ langen Hauptschneidkanten (24) an einem Oberbereich des Schneidkopfes (10) besitzen, die sich jeweils in einer Richtung vom Grundbereich zum Oberbereich erstrecken, **dadurch gekennzeichnet, dass** die genannten Schneidmittel weiterhin eine Anzahl, die höher ist als die besagte Anzahl der Hauptschneidkanten (24), relativ kurzer Randschneidkanten (44) aufweisen, welche am Grundbereich des Schneidkopfes (10) angeordnet und in Winkelintervallen um die genannte Rotationsachse (A) mit einem gegenseitigen Abstand verteilt sind.

2. Fräswerkzeug nach Anspruch 1, bei dem die Anzahl der genannten Randschneidkanten (44) mindestens das Doppelte der Anzahl der genannten Hauptschneidkanten (24) ist.

3. Fräswerkzeug nach Anspruch 1 oder 2, bei dem der Schneidkopf (10) einen Bereich (12) in Form einer Kuppel aufweist, deren Polbereich (18) den genannten Oberbereich des Schneidkopfes (10) definiert.

4. Fräswerkzeug nach Anspruch 3, worin der genannte kuppelförmige Bereich (12) des Schneidkopfes (10) die Form einer halbkugelförmigen Kuppel aufweist.

5. Fräswerkzeug nach Anspruch 3, worin der genannte kuppelförmige Bereich des Schneidkopfes (10) die Form einer halbkugeligen Kuppel aufweist, deren Unterteil abgeschnitten ist.

6. Fräswerkzeug gemäss einem der Ansprüche 3 bis 5, bei dem jede der genannten Hauptschneidkanten (24) sich vom Grundbereich (20) der Kuppel bis zum Polbereich (18) der Kuppel erstreckt.

7. Fräswerkzeug nach einem der Ansprüche 3 bis 6, bei dem sich mindestens eine der genannten Hauptschneidkanten (24) vollständig bis zu einem Punkt erstreckt, an dem sich die Achse (A) mit der Kuppel schneidet.

8. Fräswerkzeug nach einem der vorstehenden Ansprüche, bei dem jede der genannten Hauptschneidkanten (24) in einer zugehörigen radialen Ebene in Bezug auf die Rotationsachse (A) liegt.

9. Fräswerkzeug nach einem der vorstehenden Ansprüche, bei dem einige der Randschneidkanten (44) durch Endbereiche der Hauptschneidkanten (24) gebildet sind, während die übrigen Randschneidkanten (44) als individuelle Schneidkanten ausgebildet sind, die von den Hauptschneidkanten (24) getrennt sind.

10. Fräswerkzeug nach einem der vorstehenden Ansprüche, bei dem jede der genannten Hauptschneidkanten (24) durch einen zugehörigen Steg (22) gebildet wird, der sich zwischen dem Oberbereich und dem Grundbereich des Schneidkopfes (10) erstreckt und diese miteinander verbindet, und bei dem Öffnungen (46) zur Aufnahme von Material zwischen den Stegen (22) zur Überführung von abgetragenem Material in eine Innenkammer des Schneidkopfes (10) vorgesehen sind.

11. Fräswerkzeug nach einem der vorstehenden Ansprüche, bei dem der Grundbereich des Schneidkopfes (10) eine zylindrische Aussenumfangsfläche aufweist, die mit der Rotationsachse (A) konzentrisch und parallel zu ihr ist, wobei die genannte äussere Zylinderumfangsfläche (38) bei der Verwendung des Fräswerkzeuges mindestens zum Teil in die Höhlung (50) eintritt und dort zur Verhütung einer ungewollten Neigung der Rotationsachse (A) geführt wird.

12. Fräswerkzeug nach Anspruch 11, bei dem die zylindrische Aussenumfangsfläche (38) des Schneidkopfes (10) so ausgebildet ist, dass sie keine Schneidwirkung ausübt, sondern lediglich den genannten neigungsverhindernden Führungseffekt erfüllt.

13. Fräswerkzeug nach einem der vorstehenden Ansprüche, bei dem die genannte Anzahl von Hauptschneidkanten (24) zwei oder mehr ist.

14. Fräswerkzeug nach Anspruch 13, bei dem die Hauptschneidkanten (24) um die Rotationsachse (A) symmetrisch verteilt sind.

15. Fräswerkzeug nach Anspruch 13, bei dem die Hauptschneidkanten (24) unsymmetrisch um die Rotationsachse (A) herum verteilt sind.

16. Fräswerkzeug nach einem der Ansprüche 13 bis 15, bei dem die Hauptschneidkanten (24) gerippt sind.

17. Ausrüstungssatz zur Verwendung in der orthopädischen Chirurgie, enthaltend in Kombination ein Fräswerkzeug nach einem der Ansprüche 1 bis 16 zur Präparation einer Gelenkpfanne (50), insbesondere des Acetabulum, wobei das Schneidwerkzeug einen kuppelförmigen Bereich aufweist, der mit Schneidmitteln versehen ist, und eine pfannenförmige Prothesenkomponente zur Implantation in die Pfannenhöhlung (50), **dadurch gekennzeichnet, dass** das pfannenförmige Prothesenteil einen kuppelförmigen Bereich und einen zylindrischen Unterbereich aufweist, und dadurch, dass bei der Verwendung des Ausrüstungssatzes die Pfannenhöh-

lung (50) bis zu einer solchen Tiefe gefräst wird, dass ein zylindrischer Eintrittsbereich (52) darin gebildet wird, sowie dadurch, dass der zylindrische Grundbereich der Prothese mindestens zum Teil in dem genannten zylindrischen Eintrittsbereich (52) aufgenommen wird.

Revendications

1. Alésoir destiné à former une emboîture osseuse (50) ou une cavité acétabulaire, comprenant une tête de coupe (10) comportant un sommet qui, lors de l'utilisation, est dirigé vers l'emboîture osseuse (50), et une base espacée axialement du sommet le long d'un axe de rotation (A) de la tête de coupe (10), ladite tête de coupe (10) étant dotée de moyens de coupe (24, 44) destinés à enlever du matériel à partir de l'emboîture (50) au cours le la rotation de la tête de coupe (10) autour de l'axe de rotation (A), lesdits moyens de coupe (24, 44) comportant un nombre d'arêtes tranchantes principales relativement longues (24) disposées dans une partie de sommet de la tête de coupe (10), chacune d'elles s'étendant dans une direction de la base vers le sommet, **caractérisé en ce que** lesdits moyens de coupe comprennent encore un nombre, plus élevé que ledit nombre d'arêtes tranchantes principales (24), d'arêtes tranchantes périphériques relativement courtes (44) qui sont disposées à la base de la tête de coupe (10) et distribuées à des distances angulaires espacées autour dudit axe de rotation (A).

2. Alésoir selon la revendication 1, dans lequel le nombre desdites arêtes tranchantes périphériques(44) est d'au moins le double du nombre desdites arêtes tranchantes principales (24).

3. Alésoir selon la revendication 1 ou 2, dans lequel la tête de coupe (10) comprend une partie (12) en forme de coupole dont la région polaire (18) définit ledit sommet de la tête de coupe (10).

4. Alésoir selon la revendication 3, dans lequel ladite partie en forme de coupole (12) de la tête de coupe (10) prend la forme d'une coupole hémisphérique.

5. Alésoir selon la revendication 3, dans lequel ladite partie en forme de coupole (12) de la tête de coupe (10) prend la forme d'une coupole hémisphérique qui est tronquée à la base.

6. Alésoir selon l'une quelconque des revendications 3 à 5, dans lequel chacune desdites arêtes tranchantes principales (24) s'étend à partir de la région de base (20) de la coupole vers la région polaire (18) de la coupole.

7. Alésoir selon l'une quelconque des revendications 3 à 6, dans lequel au moins une desdites arêtes tranchantes principales (24) s'étend tout le long jusqu'au point où l'axe (A) s'entrecoupe avec la coupole.

8. Alésoir selon l'une quelconque des revendications précédentes, dans lequel chacune desdites arêtes tranchantes principales (24) est située dans un plan radial respectif par rapport à l'axe de rotation (A).

9. Alésoir selon l'une quelconque des revendications précédentes, dans lequel quelques-unes des arêtes tranchantes périphériques (44) sont formées par des parties terminales des arêtes tranchantes principales (24) tandis que le restant des arêtes tranchantes périphériques (44) sont des arêtes tranchantes individuelles, séparées des arêtes tranchantes principales (24).

10. Alésoir selon l'une quelconque des revendications précédentes, dans lequel chacune desdites arêtes tranchantes principales (24) est formée par une entretoise respective (22) s'étendant entre le sommet et la base de la tête de coupe (10) en les entrecoupant, et dans lequel des ouvertures de réception de matière (46) sont prévues entre les entretoises (22) pour guider de la matière découpée vers une chambre intérieure de la tête de coupe.

11. Alésoir selon l'une quelconque des revendications précédentes, dans lequel la base de la tête de coupe (10) présente une surface périphérique extérieure cylindrique, concentrique et parallèle à l'axe de rotation (A), ladite surface périphérique extérieure cylindrique (38) étant reçue avec au moins une partie dans l'emboîture (50) et guidée par celle-ci afin de prévenir une inclinaison non intentionnelle de l'axe de rotation (A).

12. Alésoir selon la revendication 11, dans lequel la surface périphérique extérieure cylindrique (38) de la tête de coupe (10) est agencée pour être exempte de tout effet de coupe mais uniquement pour exercer ledit effet de guidage de prévenir une inclinaison.

13. Alésoir selon l'une quelconque des revendications précédentes, dans lequel ledit nombre d'arêtes tranchantes principales (24) est de deux ou plus.

14. Alésoir selon la revendication 13, dans lequel les arêtes tranchantes principales (24) sont symétriquement distribuées autour de l'axe de rotation (A).

15. Alésoir selon la revendication 13, dans lequel les arêtes tranchantes principales (24) sont distribuées autour de l'axe de rotation (A) de manière asymé-

trique.

16. Alésoir selon l'une quelconque des revendications 13 à 15, dans lequel les arêtes tranchantes principales (24) sont nervurées.

17. Kit pour l'utilisation en chirurgie orthopédique, comprenant en combinaison un alésoir selon l'une quelconque des revendications 1 à 16, destiné à préparer une emboîture osseuse (50), en particulier l'acetabulum, ledit alésoir comportant une partie en forme de coupole équipée de moyens de coupe, et un composant de prothèse en forme de cupule pour l'implantation dans l'emboîture osseuse (50), **caractérisé en ce que** le composant de prothèse en forme de cupule comprend une partie en forme de coupole et une partie de base cylindrique, et **en ce que**, lors de l'utilisation du kit, l'emboîture osseuse (50) est alésée jusqu'à une telle profondeur qu'une partie d'entrée cylindrique (52) y est formée, et **en ce que** la partie de base cylindrique de la prothèse est reçue au moins en partie à l'intérieur de ladite partie d'entrée cylindrique (52).

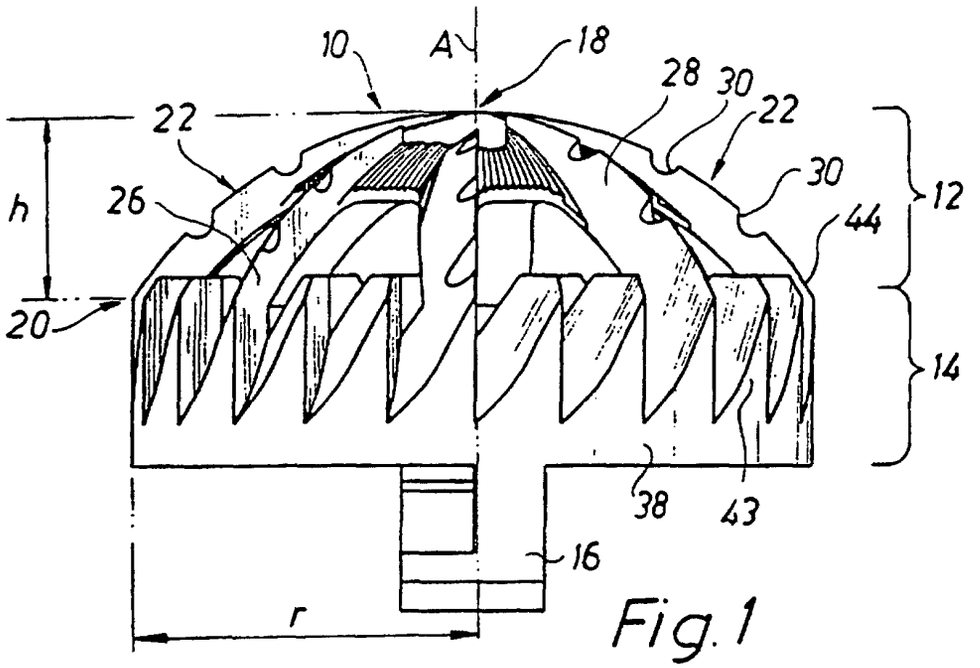
10
A
18
28
30
22
22
30
12
h
26
44
20
14
38
43
16
r

Fig. 1

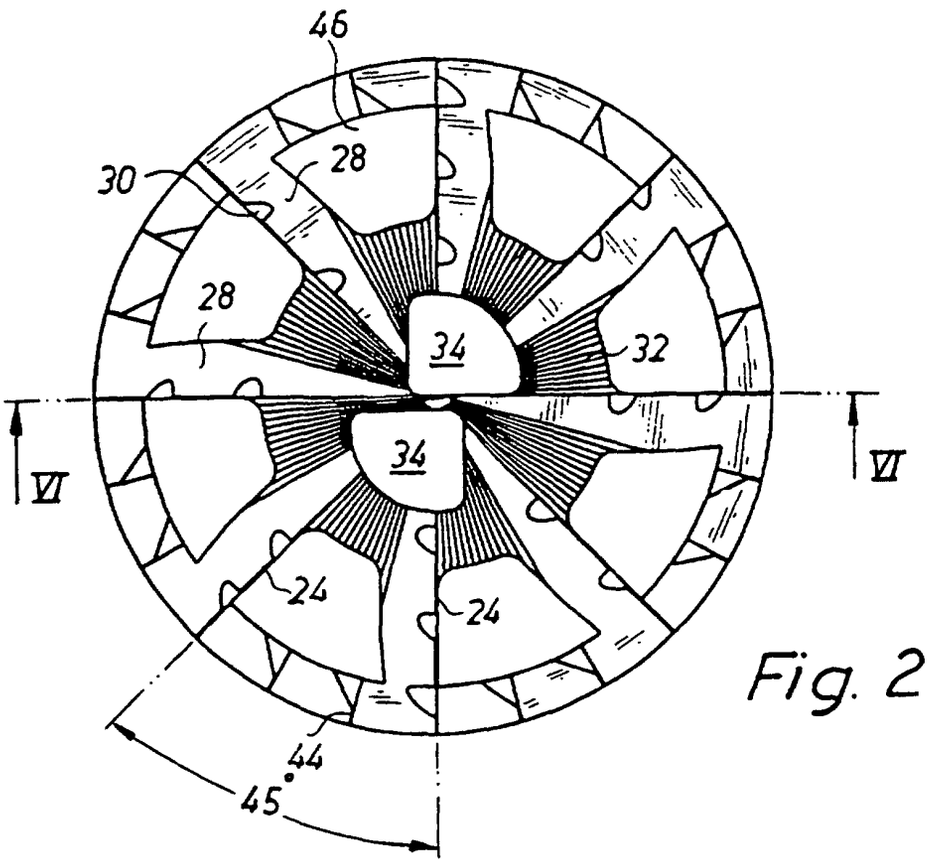
46
30
28
28
34
32
VI
VI
34
24
24
44
45

Fig. 2

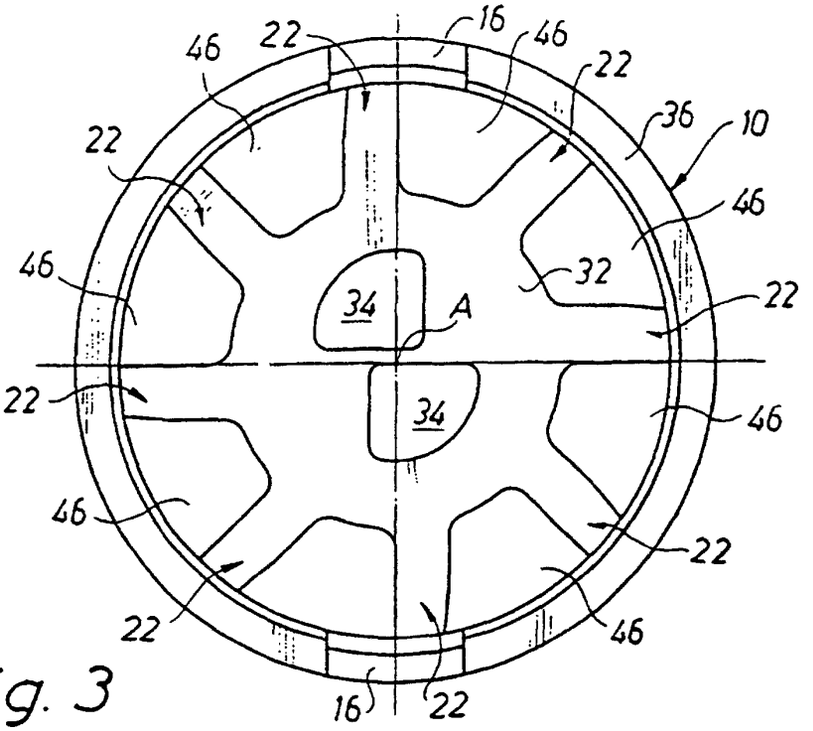

Fig. 3

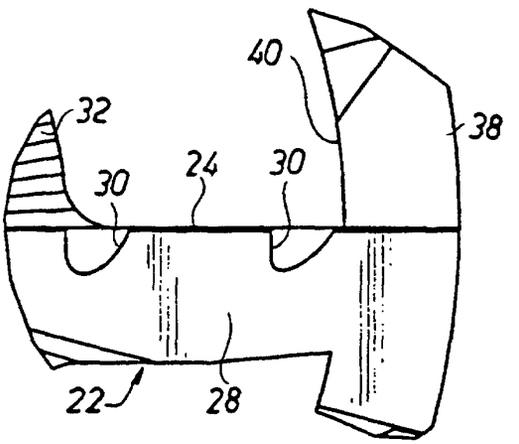

Fig. 7

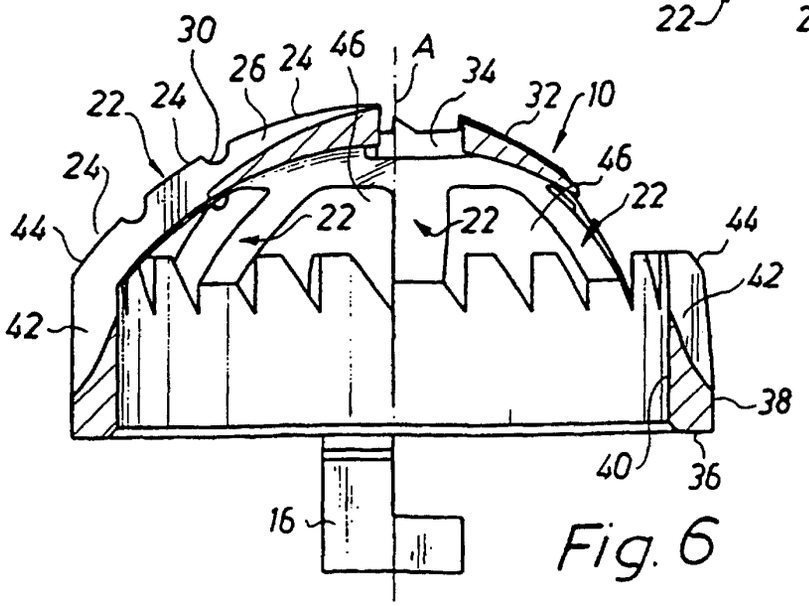

Fig. 6

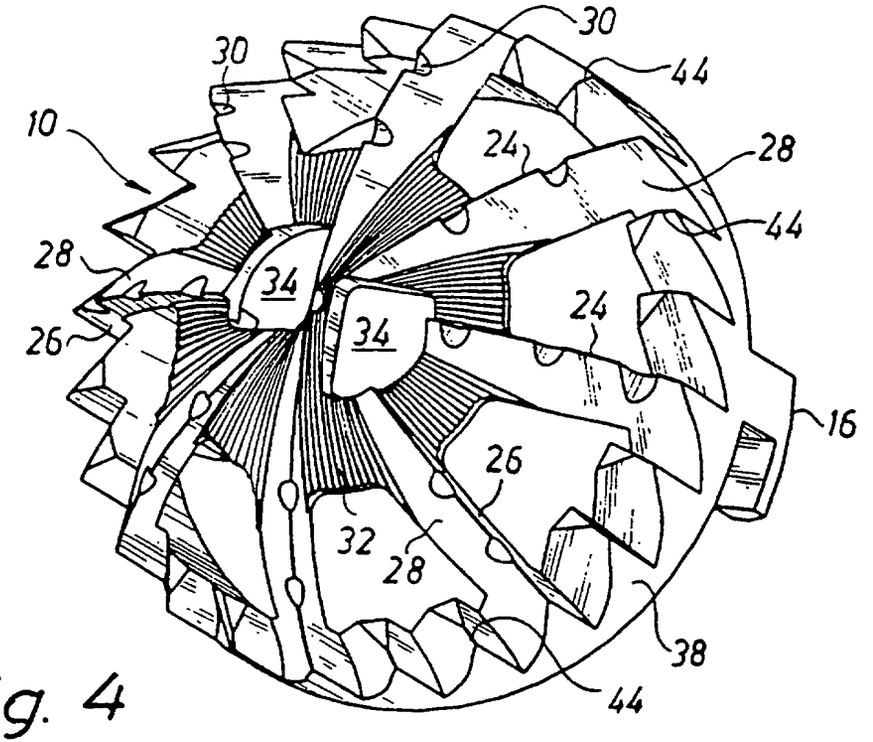
30
30
44
10
24
28
44
28
34
24
34
26
16
26
32
28
38
44

Fig. 4

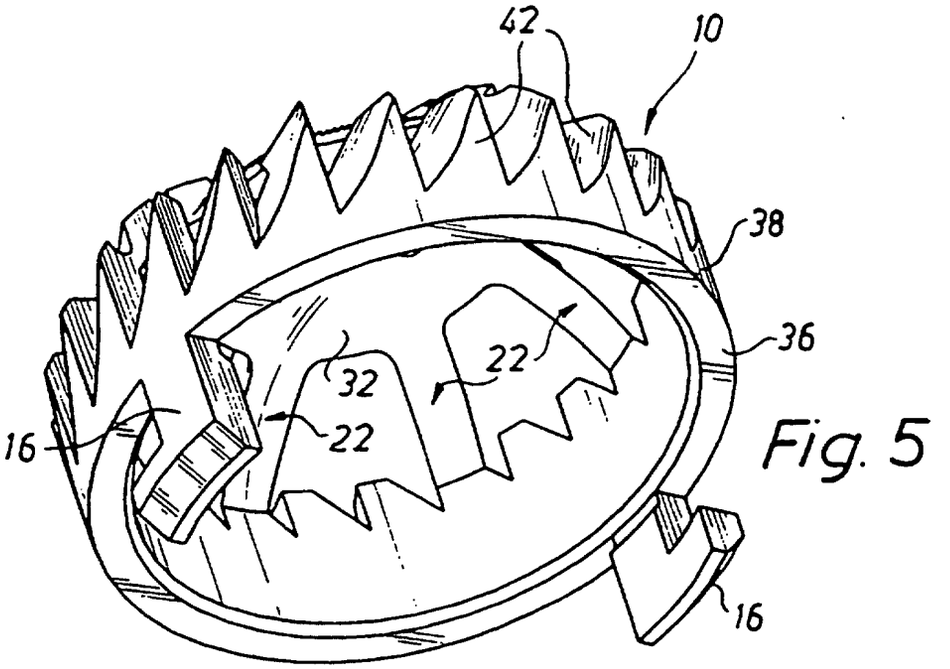
42
10
38
36
22
32
16
22
16

Fig. 5

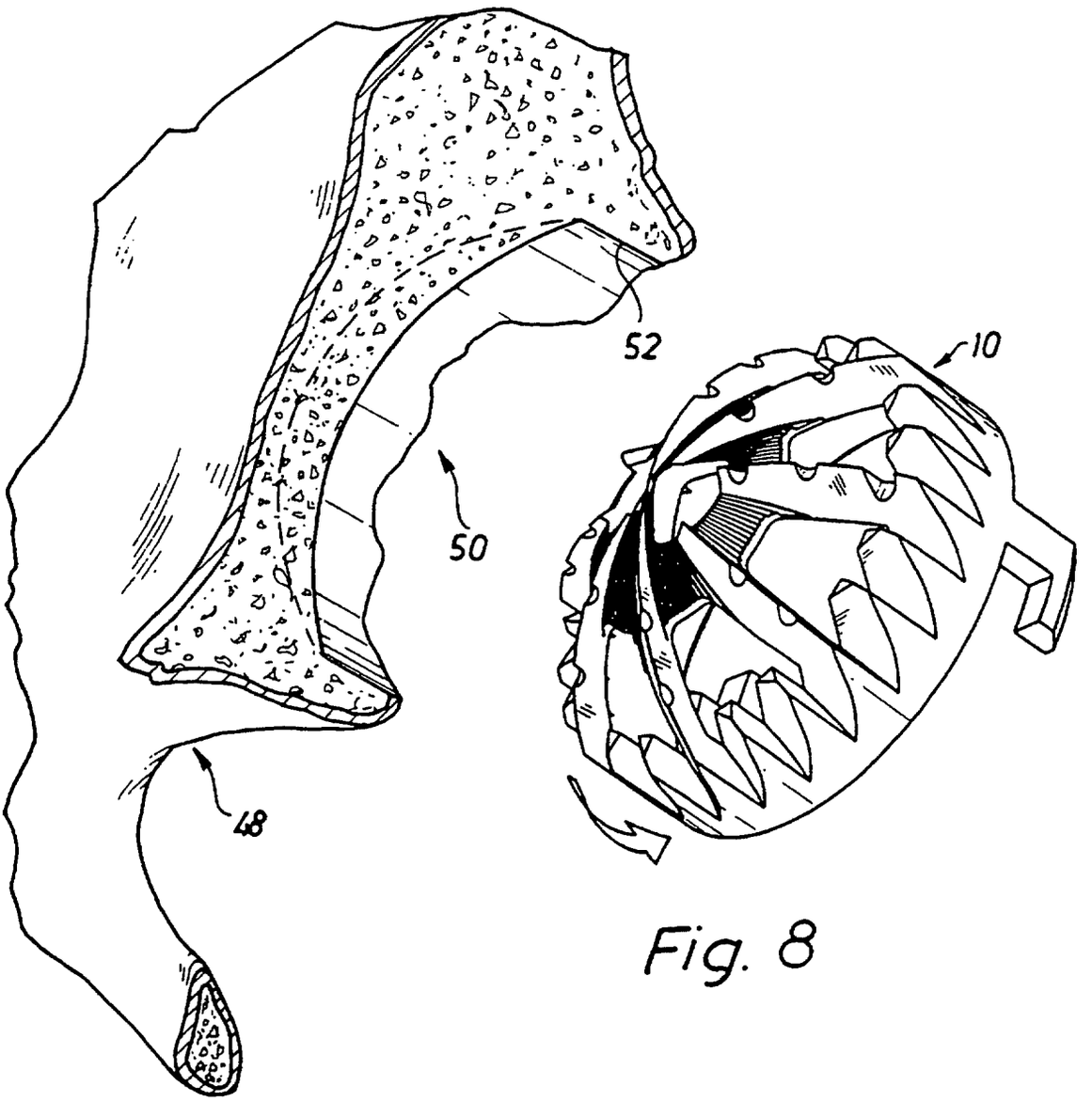

Fig. 8